Upcoming DLR Reusability Flight Experiment

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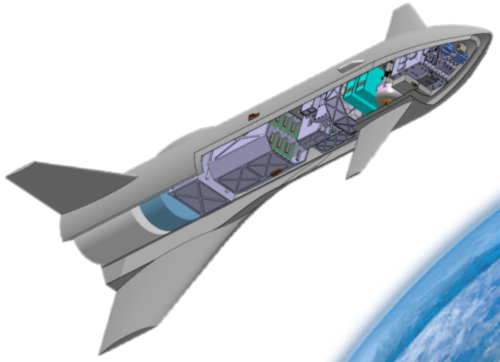

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Agenda

- Previous Research Work
- Reusability Flight Experiment (ReFex)
  - Mission Goals
  - Start & Re-Entry Configuration
  - Mission Events
- Conclusion / Outlook

Studies

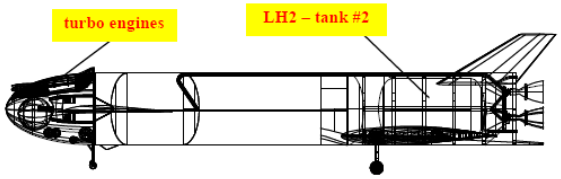


Figure 2: LFBB (Y-9) projection in the x-z-plane

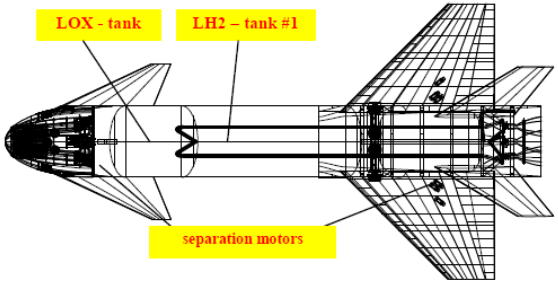
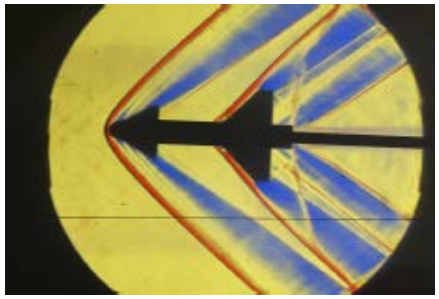
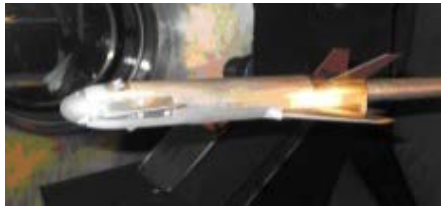


Figure 3: LFBB (Y-9) projection in the x-y-plane

Liquid Fly Back Booster (LFBB)

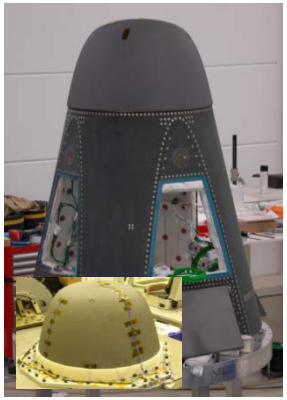




Dedicated wind-tunnel experiments

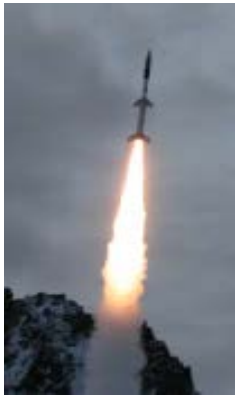
Techologies Testing (examples)

FOTON



EXPERT

HIFiRE



SHEFEX I

SHEFEX II

ReFex: Mission Requirements

Main Mission Goals:

- Controlled Re-Entry Flight from Hypersonic to Subsonic Range
- Autonomous Trajectory Generation
- Passage of RLV-Corridor
- Lateral Change of Flight Path
- In-Flight Data Acquisition
- Vehicle Recovery for Post Flight Analysis (PFA)

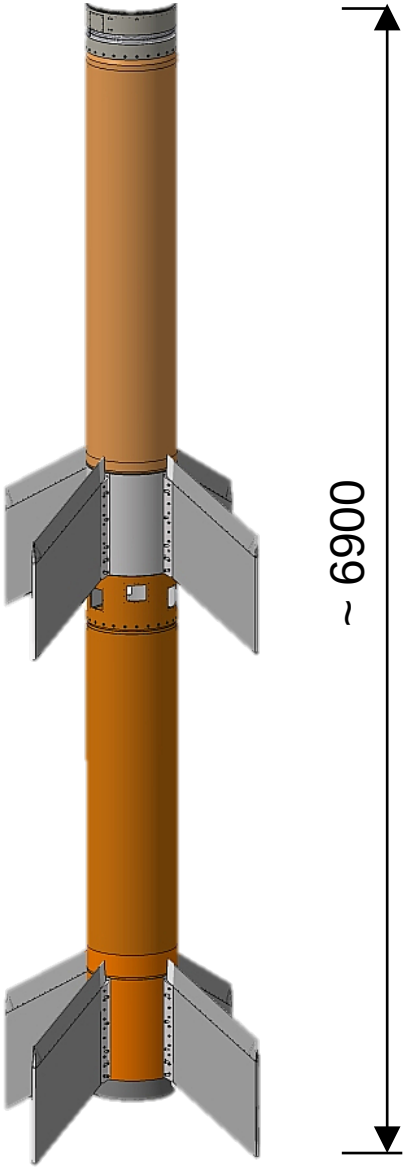
- Utilization of Flight Proven Booster
- Launch: 2021

VSB-30:

Mass ~ 2300 kg

Length ~ 6.9 m

Diameter ~ 0.6 m



VSB-30

ReFEx: Concurrent Engineering Study

Structure

Experiments

Aerodynamics

TM &TC

Control

Risk

Guidance

Mission Analysis

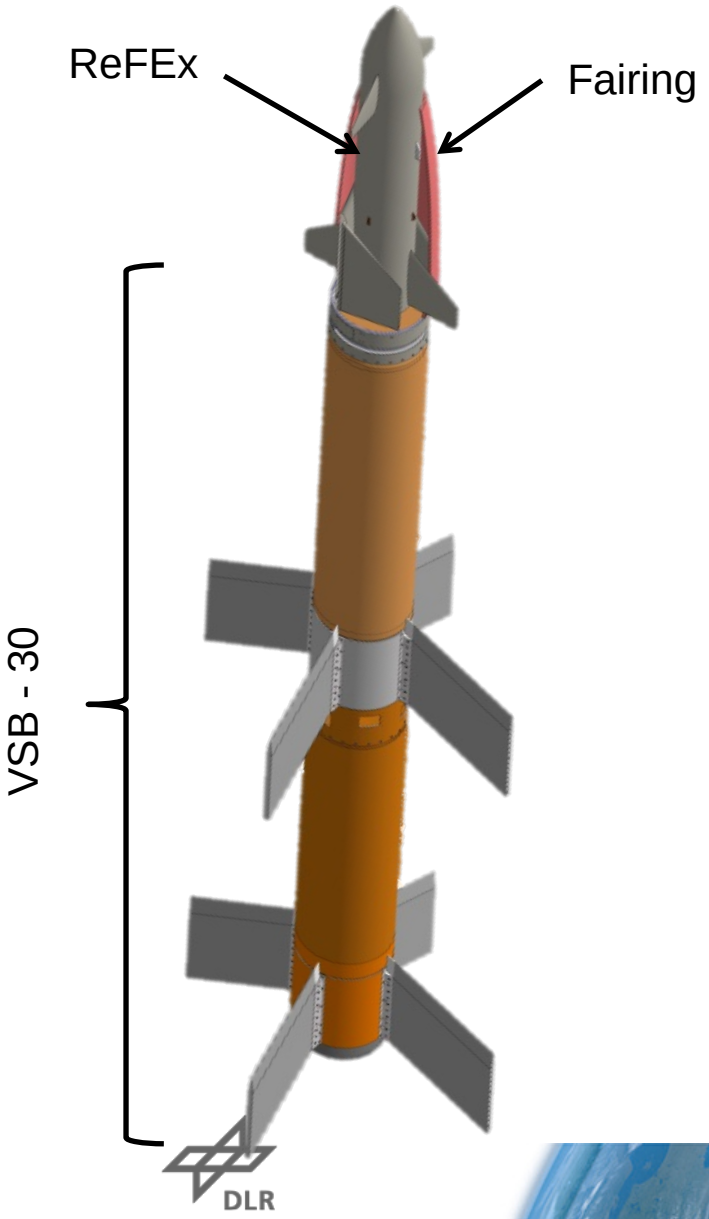
Avionics

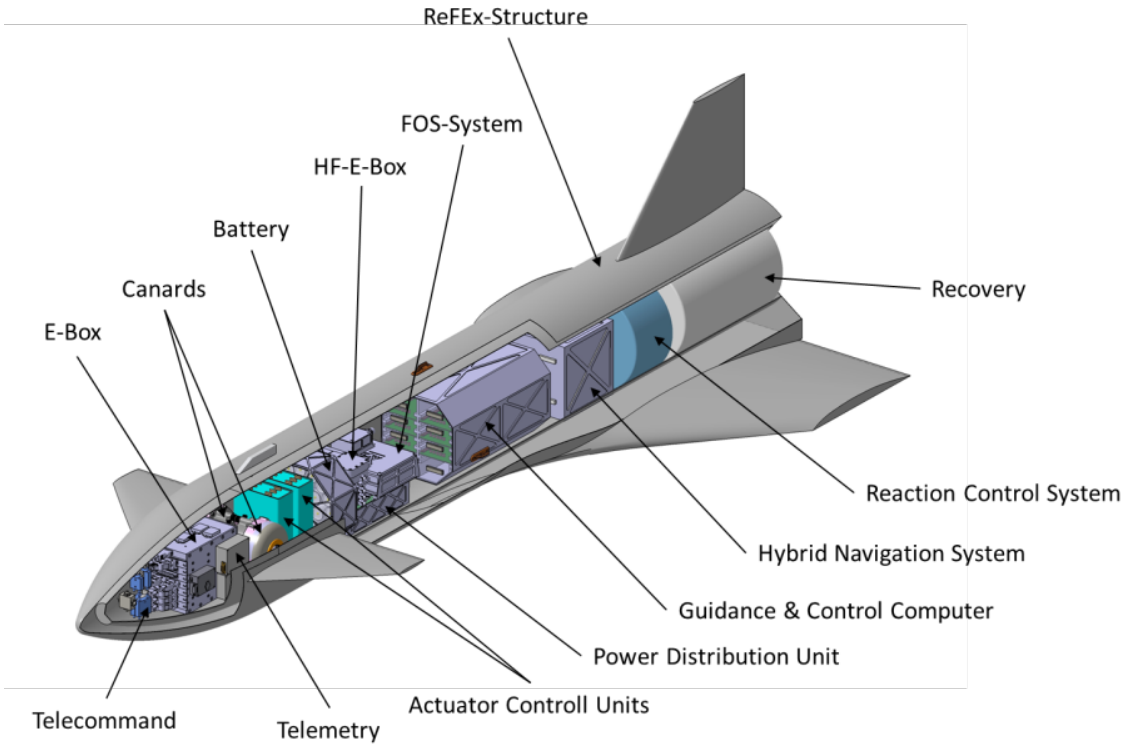
Launcher

HNS

Accomodation

ReFex: Start & Re-Entry Configuration

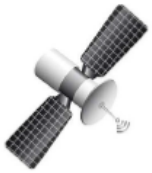




ReFEx

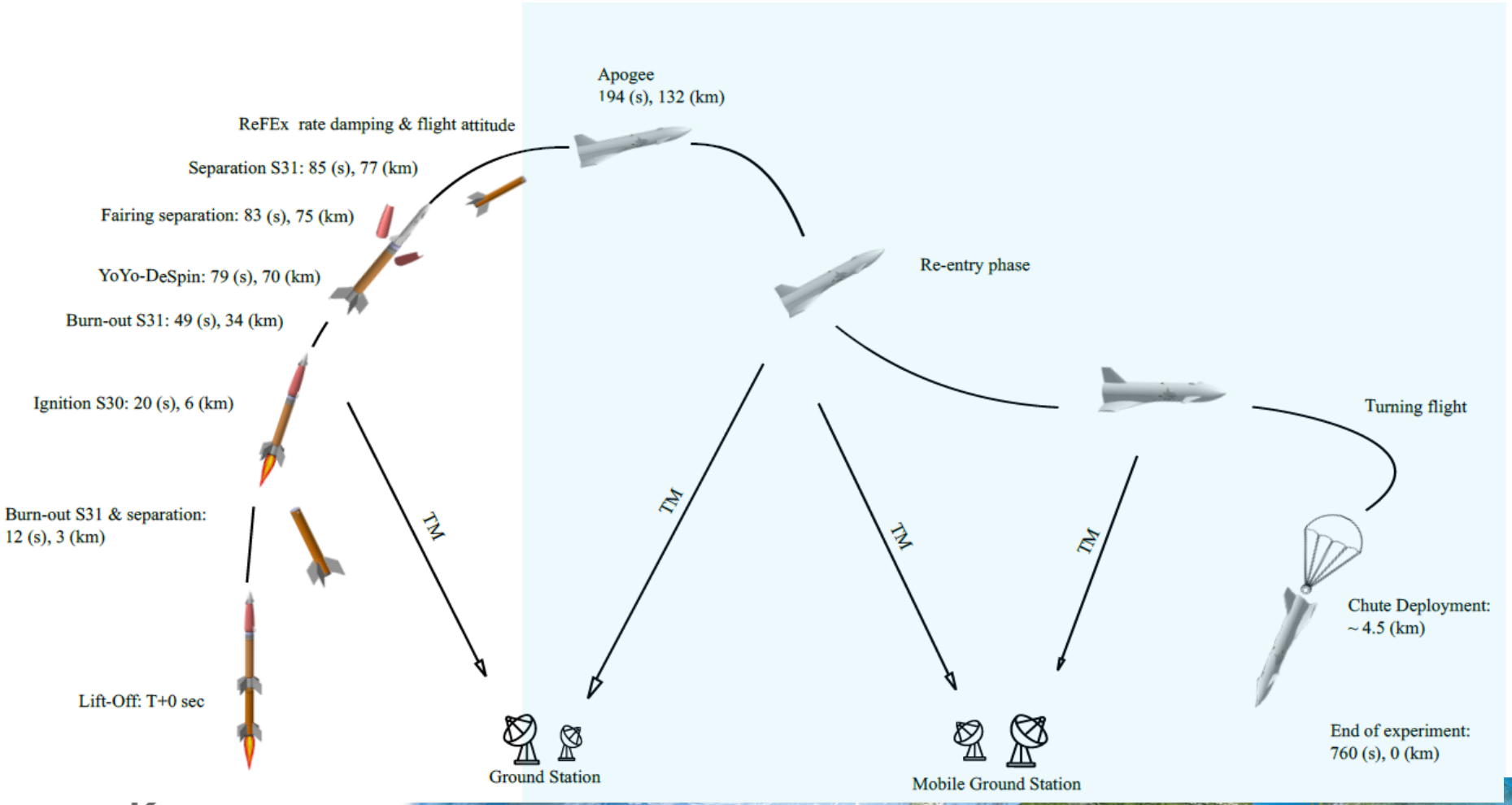
- Length: 2.7 m
- Wingspan: 1.12 m
- Mass: 450 kg

ReFEx: Mission Events



Galileo/GPS

Experimental Phase



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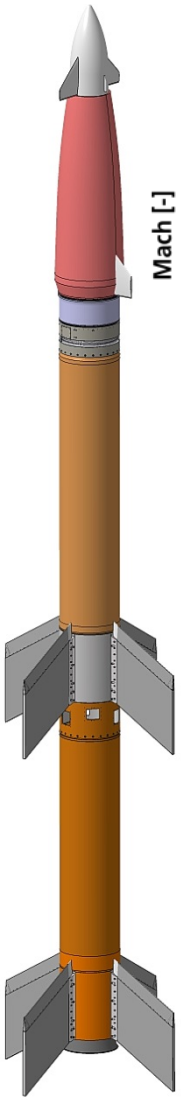
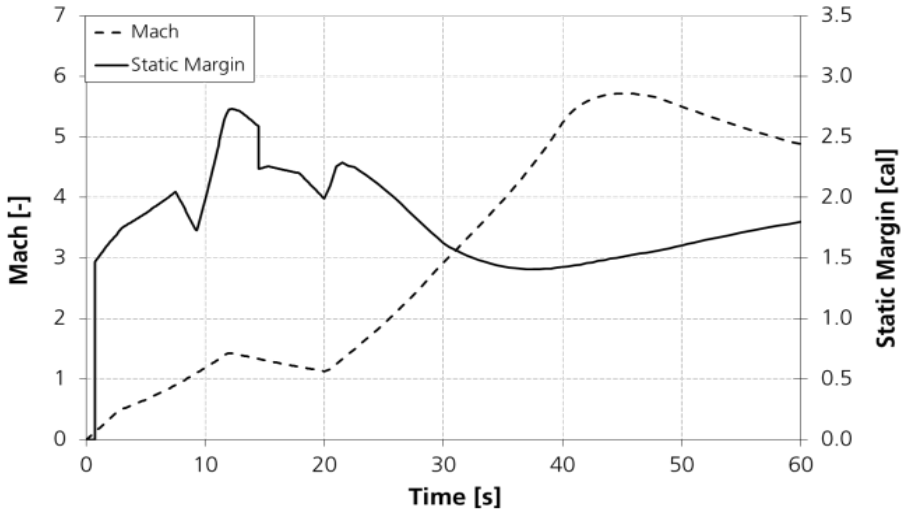
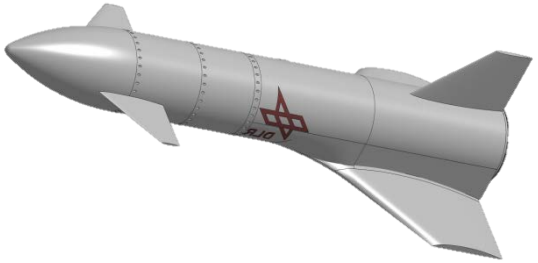
ReFEx: Launch & Re-Entry Phases

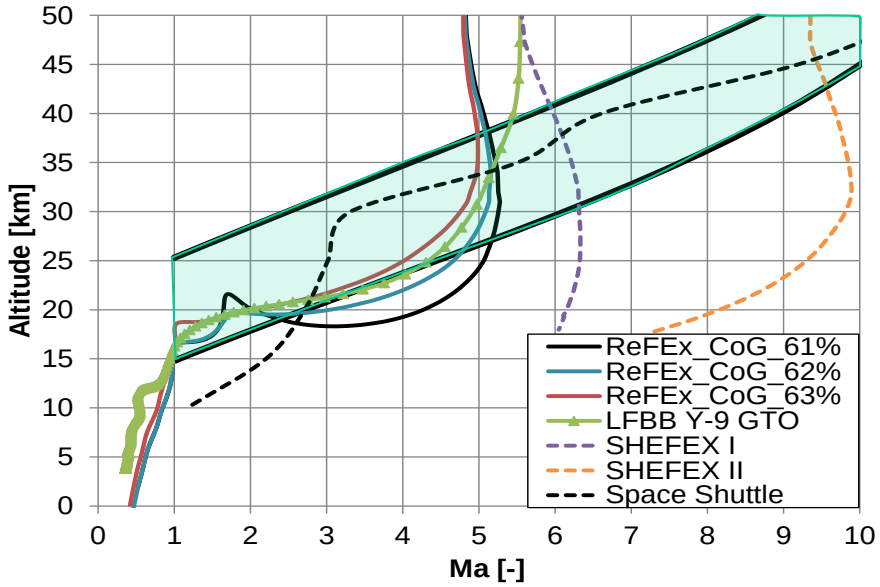




Launch Phase



Re-Entry Phase



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Conclusion / Outlook

Already performed Experiments helped to:

- Test and verify Metallic and Ceramic TPS Systems
- Investigate Aerodynamic Properties of Faceted Surfaces with Sharp Edges
- Test new Types of Measurement and Data Acquisition Techniques
- Compare of Measured Flight Data with Wind Channel Data &
  Improve S/W-Tools by utilization of Measurement Data

Upcoming Research (Flight Demo: 2021):

- Aerodynamic Design
- Development & Testing of Technologies for Autonomous Controlled Flight
- Flight Data Acquisition and S/W-Models Improvement (e.g. transsonic region)
- Mission Analysis and Trajectory Design

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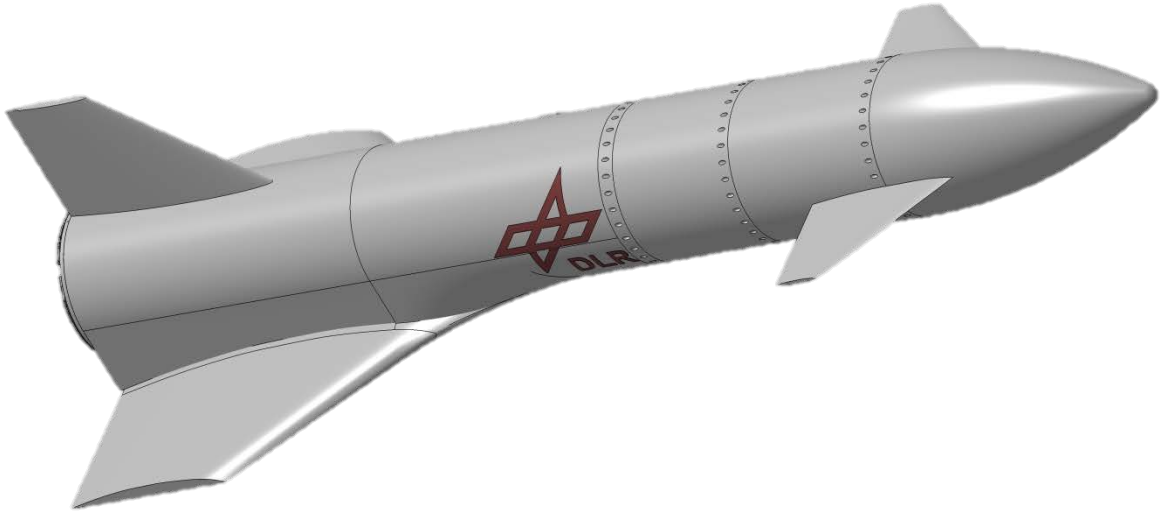
Thank you for your Attention!

Questions?



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